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January 26, 1995

William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554
STOP CODE: 1170

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Re: Ex Parte Communication
PR Docket No. 93-61
Automatic Vehicle Monitoring

Dear Mr. Caton:

Pinpoint wishes to make two few brief comments with respect to the recent exchange of letter *ex partes* submitted by Airtouch Teletrac (Teletrac) and Southwestern Bell Mobile Systems (SWBMS) on January 9 and January 19, 1995, respectively.

First, by arguing about their respective capacities, Teletrac and SWBMS merely underscore the importance of location capacity for wide-area Automatic Vehicle Monitoring (AVM) systems and, hence, the significance of bandwidth. The underlying question for the policymaker is what capacity is necessary for advanced Intelligent Vehicle Highway Systems (IVHS) applications, and how much bandwidth is necessary to achieve that capacity. This is not to say that there is not a place in the market for lower capacity AVM systems. Rather, if the Commission is to accommodate IVHS applications in the 902-928 MHz band, it must make sure that the band plan permits licensing of systems that will have the capacity to serve those applications.

Accordingly, the Commission should keep in mind that in 8 MHz, in a random address mode of operation, Pinpoint has over *thirteen* times as much capacity as SWBMS in 2 MHz, even after accounting for SWBMS's 60 per cent growth between

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January 17 and January 19, 1995.[1] Under a group address mode, Pinpoint's rate is upwards of 3,000 vehicles per *second*, which translates to approximately *twenty-seven* times the capacity of the SWBMS Quiktrak system. In comparison with Teletrac's claims of 200,000 locations per *hour* in 3.87 MHz, the Pinpoint system achieves from *twenty-seven to fifty-four* times as much capacity as the Teletrac system in only twice the spectrum.

Moreover, unlike Teletrac or SWBMS, Pinpoint has acknowledged it can time-share. Thus, for example, in an 8 MHz allocation, four SWBMS 2 MHz systems could co-exist "side-by-side." Through time-sharing, four systems with Pinpoint's location rate could share the 8 MHz band, each retaining more than *three* times the capacity of 2 MHz systems such as SWBMS's.

At bottom, therefore, the exchange between Teletrac and SWBMS confirms the wisdom of adopting Pinpoint's approach to the band plan for AVM: Systems with lower-capacity requiring or desiring exclusive spectrum should be able to bid for it in an auction of spectrum between 902-912 or 904-912 MHz. Systems capable of time-sharing, in contrast, should be able to share 8 MHz of spectrum at the upper end of the 902-928 MHz band. (Systems in the time-shared band should not be required to use 8 MHz.) In this way, *all* AVM proponents will have the opportunity to deploy their systems as designed.

Second, the January 19, 1995, SWBMS letter inaccurately states that the "Virginia Tech Report",[2] which was funded entirely by SWBMS, is the only "independent" discussion of the relationship between bandwidth and capacity in the record. Pinpoint would remind SWBMS and the Commission of the report filed with the Commission on December 7, 1994 entitled "On the Effect of Bandwidth on the Performance of AVM Systems Operating in the 902-928 MHz ISM Band" prepared at the request of Pinpoint Communications, Inc. ("*Georghiades Paper*") The paper was

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[1] In a January 17, 1995, letter to William Caton, SWBMS's counsel reported, for the first time in this proceeding, that SWBMS's capacity was upwards of 250,000 per hour, twice the previous estimate of 120,000 (for 1994) made in SWBMS's July 29, 1993, Reply Comments. Two days later, in another letter to the FCC Secretary, the letter to which this correspondence responds, SWBMS claimed that its location capacity was really 400,000 per *hour*.

[2] "Final Report" of the Mobile and Portable Radio Research Group of the Electrical Engineering Department at Virginia Tech: "Capacity and Interference Resistance of Spread-Spectrum Automatic Vehicle Monitoring Systems in the 902-928 MHz ISM Band," filed in PR Docket No. 93-61, on October 19, 1994.

authored by Dr. Costas N. Georghiades, Associate Professor in the Electrical Engineering Department of Texas A&M University, one of the three "Research Centers of Excellence" recognized by the Intelligent Transportation Society of America.

In his paper, Dr. Georghiades addresses the effects of wider bandwidths (*e.g.* 8-10 MHz) on the performance of wide-area AVM systems. In sharp contrast to the results of the Virginia Tech Report, which he discusses, Dr. Georghiades finds that:

> wideband systems in the range of 8 to 10 MHz are significantly better able to combat multipath compared to narrowband systems with 1 to 2 MHz. This capability benefits *both data detection and location accuracy*. Moreover, wideband systems provide a number of location fixes per second which increases as the square of the bandwidth, for the same power.[3]

Dr. Georghiades also notes that:

> The central question is not whether AVM systems *can* be built at smaller bandwidths. Rather, in the severe multipath environments in which AVM systems will operate, can systems capable of providing sufficiently accurate location and adequate capacity for intelligent vehicle highway systems (IVHS) be built if bandwidth is not increased . . .. AVM systems are expected to greatly facilitate implementation of IVHS by providing both messaging and location monitoring capabilities to large numbers of vehicles at a time. To do so, they require large bandwidths.[4]

The *Georghiades Paper* is no less "independent" than the Virginia Tech Report. Accordingly, it is simply untrue when SWBMS claims that the evidence in the record inexorably leads to the conclusion that bandwidths in excess of 2 MHz lead to only a marginal increases in location capacity, no material improvement in multipath resolution, and no more than linear improvements in data capacity. Indeed, given the *Georghiades Paper* combined with the real world experience of Pinpoint in operating its Washington, D.C. experimental system, there is extremely strong evidence that these claims by SWBMS are all false.

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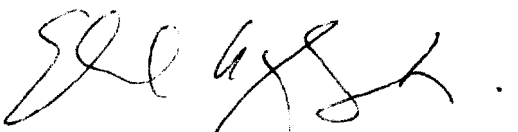
[3] *Georghiades Paper* at 1 (emphasis added).

[4] *Id.* at 4.

The implications for the outcome of this rulemaking should be clear. The Commission should make accommodations for wide-area AVM systems of 8 MHz bandwidth, or more, on a time-shared basis in a sub-band of at least 8 MHz. In addition, to accommodate lower capacity systems seeking exclusivity, the FCC may consider auctioning a separate sub-band in smaller blocks of spectrum.

If there are any questions regarding this letter, please do not hesitate to contact the undersigned.

Respectfully submitted,



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